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Relationships Between Personal Biography and Changes in Preservice Classroom Teachers' Physical Activity Promotion Competence and Attitudes

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Personal biography influences preservice classroom teachers' (PCT) perceptions and attitudes related to school-based physical activity promotion (SPAP). Using an uncontrolled prepost design, this study investigated associations between biographical variables and changes in PCTs' SPAP attitudes and perceived competence while enrolled in a 16-week SPAP course. PCTs (N = 201) completed baseline measures assessing biographical variables of year in school, sports participation, coaching/teaching experience, BMI, satisfaction with K-12 physical education (PE) and perceived physical activity (PA) competence, and prepost measures assessing SPAP attitudes and perceived competence. One-way repeated measures analysis of variance procedures showed statistically significant, positive changes in PCTs' scores on all SPAP measures. Mixed-model analysis of variance/covariance techniques indicated sport participation, teaching/coaching experience, PE satisfaction and perceived PA competence were associated with changes in SPAP scores. Results suggest PCTs' SPAP learning experiences should incorporate strategies for enhancing self-schemas and perceptions related to PE and PA.

Keywords: nonspecialist teachers, elementary education majors, primary teachers, comprehensive physical activity programs, teacher education, teacher biography

It is clear from research that teachers are a critical element in efforts to make significant changes in schools, such as when new programs and practices are introduced and implemented to address pressing health issues (e.g., mental health, alcohol abuse; Han & Weiss, 2005). As demonstrated in the prevention literature, the sustainability of school-based health interventions encompassing United States (US) and international contexts depends on the extent to which teachers and other key change agents (e.g., principals) continue the implementation effort with fidelity (Dane & Schneider, 1998; Dusenbury, Brannigan, Falco, & Hansen, 2003; Rohrbach, Graham, & Hansen, 1993). Therefore, identifying underlying factors which

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facilitate teachers' approach tendencies toward evolving ideologies and emerging recommendations for best practices in education is a necessary step in understanding and orchestrating the school change process.

A current focus of school change is school-based physical activity promotion (SPAP). The link between inactive lifestyles and the heightened prevalence of obesity (Pate et al., 2006; US Department of Health & Human Services, 1996) has spurred considerable discourse related to the important role schools can play in helping children and adolescents reach recommended levels of daily physical activity (PA) (Centers for Disease Control and Prevention [CDC], 1997; Kaplah, Liverman, & Kraak, 2004; Pate et al., 2006; Wechsler, McKenna, Lee, & Dietz, 2004). Moreover, a growing literature base describing the association between active behavior and numerous indices of academic success (e.g., Coe, Pivarnik, Womack, Reeves, & Malina, 2006; Robert Wood Johnson Foundation [RWJF], 2007; Tomporowski, Davis, Millier, & Naglieri, 2008; Trudeau & Shephard, 2008) is serving to further fuel a movement toward policy-driven program implementation focused on integrating PA experiences across multiple contexts throughout the school day (RWJF, 2009).

One trend in the recommendations for SPAP is an emphasis on the contribution elementary classroom teachers can make to the overall efforts of schools in combating the obesity crisis in children (CDC, 1997; Faber, Kulinna, & Darst, 2007; Maeda & Murata, 2004; NASPE, 2008; Pate et al., 2006; President's Council on Physical Fitness and Sports, 2006; Yaussi, 2005). Classroom teachers typically meet with children more than any other teacher and lead or supervise children in many contexts including the academic classroom, recess, and often before and after school programs (e.g., clubs, intramurals). Thus, notwithstanding the obvious importance of quality physical education (PE) to SPAP (Sallis & McKenzie, 1991; NASPE, 2008), classroom teachers are ideally positioned to provide additional PA opportunities to children in several school settings where PE teachers tend to have relatively limited access. Reductions and cuts in PE programs and the fact that only eight percent of elementary schools in the US require daily PE (NASPE, 2006) underline the pressing need for classroom teacher involvement in SPAP.

Despite the call for classroom teachers to assume supportive roles in schools as PA activists, little research has examined the feasibility of current recommendations. One context needing increased attention is preservice (i.e., university) education. At this early career stage, preservice classroom teachers (PCTs) are often confronted with educational experiences, which challenge PCTs to reexamine their beliefs about teaching. This represents a critical period in teacher development, as preestablished beliefs about and dispositions toward the teaching role, which develop through one's life history, tend to be robust and resistant to the change process that teacher education strives to catalyze and nurture (Doolittle, Dodds, & Placek, 1993; Lawson, 1983; Lortie, 1975; Pajares, 1992; Schempp, 1989; Zeichner & Gore, 1990). How PCTs feel about serving as PA promoters, what effects formal education has on these feelings and what variables might influence or mediate the effects of teacher education are questions that need to be answered to ensure preservice training can play an effective part in preparing PCTs for SPAP. The present study used the lens of teacher biography to better understand the role of personal background in efforts to provide PCTs with the basic knowledge and skills needed to foster a value for and perceived competence in promoting PA at school.

Relationship Between Classroom Teachers' Personal Biographies and Perceptions

The role of personal biography in preservice education has been well examined from several perspectives (e.g., Bullough, 1990; Knowles & Holt-Reynolds, 1991), including its role in numerous outcome variables related to SPAP (Callea, Spittle, O'Meara, & Casey, 2008; Faulkner & Reeves, 2000; Faulkner, Reeves, & Chedzoy, 2004; Katene, Faulkner, & Reeves, 2000; Matanin & Collier, 2003; Morgan & Bourke, 2008; Morgan, Bourke, & Thompson, 2001; Morgan & Hansen, 2008; Parks, Solmon, & Lee, 2007; Webster, Monsma, & Erwin, 2010). However, most of this research was conducted exclusively about PE teaching, given concerns about how well prepared and willing classroom teachers are to teach PE in schools where there is no specialist (i.e., certified physical education teacher) (Rink, Hall, & Webster, 2008). For example, Faulkner et al. (2004) found PCTs' self-reported PA behavior predicted intentions to teach PE, and Morgan and Bourke (2008) found PCTs' and inservice classroom teachers' personal PE experiences were associated with confidence to teach PE. In addition, Morgan et al. (2001) found personal PE experiences and sport participation experiences were associated with PCTs' attitudes toward teaching PE.

Comparatively little research has examined the role of teacher biography in classroom teachers' perceptions and attitudes related to promoting PA in school settings outside of the PE context. Parks et al. (2007) investigated elementary classroom teachers' willingness and efficacy to integrate PA into the academic classroom setting. Contrary to findings about PE teaching, the authors reported that current personal involvement in PA was not related to participants' efficacy to implement PA. However, historical aspects of personal PA participation may be more relevant to classroom teachers' perceptions of promoting PA at school. Cothran, Hodges Kulinna and Garn (2010) interviewed 23 elementary classroom teachers about a project in which PA was integrated into the school day. Findings indicated that willingness to engage in PA integration was related to participants' personal wellness histories, including physically active behavior and a healthful diet. PA history was also one of several biographical perspectives employed in a study by Webster et al. (2010). Results showed that PCTs who had experience teaching/coaching in PA settings had higher perceived competence across the three different contexts of PA promotion investigated (PE, classroom/recess, and extracurricular, i.e., before and after school settings).

Webster et al. (2010) also identified several other biographical variables that may be important to PCTs' perceptions and attitudes about SPAP. Correlational analyses highlighted age, body mass index (BMI), year in school and satisfaction with K-12 PE experiences as important factors in participants' perceived competence and attitudes. Specifically, age was negatively correlated with PE teaching competence, BMI was negatively correlated with PE teaching competence and extracurricular competence, year in school was positively correlated with classroom/recess competence and PE teaching competence, and satisfaction with K-12 PE experiences was positively correlated with competence in all three SPAP contexts as well as with attitudes. Furthermore, hierarchical regression analysis revealed that participants' PA competence (how physically active and fit participants perceived

themselves) accounted for 12% of the variance in attitudes. Based on these findings, it appears that an inclination for SPAP may be less likely for PCTs who are older, have higher BMIs, are at earlier rather than later stages of a program, report less favorable PE experiences, and/or have lower perceived PA competence than their program peers. The link between these biographical characteristics has not been investigated, though it seems such characteristics may be based in one or more components of an individual's self-identify, such as a self-schema specifically for SPAP.

Role of Teacher Education in Classroom Teachers' Perceptions

Research examining the effectiveness of teacher education programs to function as support mechanisms for classroom teachers to successfully assume roles as PA promoters is limited. Moreover, studies have mostly focused on classes in which PCTs were taught to teach PE but not to promote PA in additional school settings concurrent with the previously discussed recommendations (Ashy & Humphries, 2000; Hart, 2005; Xiang, Lowy, & McBride, 2002). These studies do suggest preservice education can have a positive impact on classroom teachers' perceptions related to teaching PE. Specifically, Ashy and Humphries (2000) found that PCTs' enrolled in a course, which included teaching experiences, peer observation, self-reports and instructor feedback, developed a better understanding of and more positive attitudes toward PE. In addition, Xiang et al. (2002) found that completing a field-based PE methods course, particularly teaching and observation experiences, enhanced PCTs' beliefs regarding the value and purpose of elementary PE. Consistent with these studies, Hart (2005) found that giving PCTs' instruction related to fundamental movement skills as part of a course increased participants' ability to correctly identify such skills and justify their importance in motor learning. These studies identify a range of preservice experiences that might prompt PCTs to value PE, understand its purpose and even develop basic movement analysis skills, which indicates preservice training can help to lay the foundation for and ensure developmental readiness for PCTs' learning about how to teach PE.

Despite these apparent benefits of courses designed to help PCTs' teach PE, research overwhelmingly indicates that such benefits are not sufficient to evoke meaningful or adequate learning. For example, Ashy and Humphries (2000) determined that in spite of positive course outcomes in terms of PCT's understanding of and attitudes about PE, PCTs did not have sufficient content knowledge to plan their own PE programs. Moreover, Xiang et al. (2002) found that even though PCTs reported more adaptive beliefs about the value and purpose of PE following completion of their course, half of the participants reported being unwilling to teach PE, with a slight increase in the number of unwilling participants at the end of the course than at the beginning. Other research has consistently described classroom teachers' avoidance tendencies toward teaching PE, demonstrating that classroom teachers do not prioritize PE compared with other subject areas and lack motivation and confidence to teach it (Brumbaugh, 1987; Faucette & Hillidge, 1989; Faucette & Patterson, 1989; Morgan, 2008; Morgan & Bourke, 2008). Such perceptions seem to eventually entwine with classroom teachers' PE teaching behavior, which has been shown to lack quality and richness from several perspectives (Faucette

& Hillidge, 1989; Faucette, McKenzie, & Patterson, 1990; Faucette & Patterson, 1989; Lawson, Lawson, & Stevens, 1982; Morgan & Hansen, 2007; 2008). Collectively, the research seems to suggest that helping classroom teachers to develop value orientations, confidence and skills needed to provide quality PE experiences may require more training than what is possible in most preservice programs.

The present study was founded on the belief that increased attention should be given to the potential of classroom teachers to play a supportive role in SPAP as advocates and activists within the academic classroom, at recess and in extracurricular settings. While continued focus on variables which impact classroom teachers' perceptions related to teaching PE should continue given that this challenge for nonspecialists still exists in many schools, it is also becoming increasingly important to respond to the shifting tide of thought regarding best practices for PA promotion in schools. Initial studies offer a hopeful perspective regarding the potential of classroom teachers to extend PA opportunities at school beyond the PE-based learning experiences that are at the center of a comprehensive approach to promoting active behavior. Classroom teachers were shown to have positive perceptions about providing movement experiences for children in the academic classroom (Parks et al., 2007; Webster et al., 2010), at recess and in extracurricular settings (Webster et al., 2010). There is also some evidence that preservice education may provide a useful platform for preparing PCTs as PA promoters at school. Webster et al. (2010) reported a trend for PCTs' who had taken coursework related to promoting PA to report higher perceived competence in promoting PA in the classroom and at recess than PCTs' who had not taken such coursework. However, given that personal biography seems to influence classroom teachers' perceptions and attitudes about SPAP, research is needed to better understand the implications of teachers' backgrounds for the overall effectiveness of efforts to train PCTs for working as collaborative partners in school-based efforts to fight childhood obesity.

The purpose of this study, therefore, was to examine the influence of personal biography on changes in PCTs' perceived competence and attitudes about SPAP within the context of a college course designed to foster PCTs' skill base and positive dispositions for SPAP. Biographical variables including BMI, PA competence, year in school, sports participation, PA-related teaching/coaching experience and satisfaction with K-12 PE experiences were investigated in relation to changes in SPAP attitudes and perceived competence. Two research questions were asked: (a) are there statistically significant changes in SPAP attitudes and perceived competence from the beginning to the end of the course, and (b) if so, are changes in SPAP attitudes and perceived competence associated with the aforementioned biographical variables as measured at the beginning of the course? This study was designed to extend the existing SPAP research with PCTs and specifically build on the Webster et al. (2010) study, in which new measures were developed and used to assess PCTs' SPAP attitudes and perceived competence in relation to biographical characteristics. While Webster et al. (2010) established that many of the biographical characteristics of interest in the present investigation were important to PCTs' SPAP attitudes and perceived competence, it is not yet clear how these variables relate to one another in the context of preservice training designed to prepare PCTs for SPAP. Understanding more about associations between PCTs' personal biography and changes in SPAP attitudes and perceived competence during such training

will help to expand the developing knowledge base about the role of biographical characteristics in SPAP promotion and also provide some initial perspective on possible considerations for effective SPAP training in teacher education.

Method

Participants and Setting

Participants in this study were 201 PCTs (mean age = 20.8 years) enrolled in nine sections of a semester-long (16 weeks) PA promotion course taught by six different instructors across three semesters (Fall 2008, Fall 2009, Spring 2010). PCTs were elementary education and early childhood majors at the researcher's university and included almost all females (96%) who were predominantly White Caucasian (89%) and in their junior (47%) and sophomore (31%) years. The number of participants ranged from 18 to 26 for each of the class sections represented in this study (student enrollment is usually capped at 30).

The course was designed specifically for PCTs aspiring to work in elementary schools or early childhood educational settings. The author, being one of the course instructors, obtained course syllabi from the other instructors before the start of the study and before the beginning of each subsequent semester in which data were collected to examine the level of consistency in how the course was being taught across sections. Information on course syllabi included required textbooks, additional required readings and recommended resources, course objectives, instructional strategies/learning experiences and a topical outline. An examination of this information revealed all instructors shared a common perspective, purpose, agenda, and instructional approach to teaching the course, based on current recommendations for classroom teachers to be involved with PA promotion in multiple school contexts.

Overall, PCTs were expected to be able to demonstrate awareness of their critical role in SPAP and skill in being a PA promoter in the classroom, at recess and in extracurricular settings. PCTs were also expected to be able to appreciate the unique contribution of PE programs to a school curriculum and demonstrate basic skills in teaching elementary PE content (primarily dance and games, which can be easily integrated with learning activities in the academic classroom). Instructional strategies/learning experiences common to all sections included didactic instruction in the classroom related to major PA concepts (e.g., moderate versus vigorous PA), recommendations (e.g., youth PA guideline of at least 60 min of daily PA), benefits (e.g., improved health, better academic performance) and trends (e.g., reduction of PE programs and recess); student presentations (e.g., leading classroom-based movement breaks); and planning and teaching experiences related to PA promotion (e.g., teaching a classroom-based lesson that integrates PA or PE content with academic content, teaching a PE lesson). Thus, the course was designed to enhance PCTs' skills and dispositions related to SPAP. It was not, however, designed to directly alter biographical variables being investigated in this study, which preservice training could potentially influence (e.g., BMI, PA competence). Attempting to also change PCTs' biographical characteristics was not viewed as a realistic goal in this study, given the already extensive course curriculum covering SPAP competencies in multiple school contexts.

Instrumentation

Biographical Questionnaire (Webster et al., 2010). Biographical information was collected using a 16-item questionnaire assessing participants' self-reported age, gender, race, height and weight (used to calculate BMI), year in school (freshman, sophomore, junior, senior, graduate), sport participation (yes/no), PA-related teaching/coaching experience (yes/no), perceived PA competence (PA-Comp) and satisfaction with K-12 PE experiences (PE-Sat). PA-Comp was measured with five items (e.g., "I am physically active") using a four-point Likert scale (1= Strongly Disagree; 4 = Strongly Agree) (Frary, 2003; Maitland, 2009). PE-Sat was measured with three items (e.g., "My elementary physical education experiences were positive") using the same response scale. Webster et al. (2010) used exploratory factory analysis to yield the items for the PA-Comp and PE-Sat measures. The items were shown to have good construct validity (explaining over 62% of the variance), internal consistency ($\alpha > .8$) and stability (.78–.91, $p < .001$).

School-Physical Activity Promotion Competence Questionnaire (SPAP-CQ, Webster et al., 2010). The SPAP-CQ consists of 15-items assessing PCTs' perceived competence in promoting PA in three general school contexts: classroom/recess (CR-Comp; 7 items), extracurricular (EX-Comp; 3 items) and PE (PE-Comp; 5 items). Example items include "Create opportunities for my students to participate in safe physical activity in the classroom", "Lead a before or after school physical activity program" and "Use developmentally appropriate practices when teaching elementary physical education content". The measure uses an 8-point Likert scale (0 = No Skills; 7 = Many Skills). Webster et al. (2010) used exploratory factor analysis to yield the items for the SPAP-CQ. The items for the three subscales were shown to have good construct validity (explaining over 72% of the variance), adequate internal consistency ($\alpha > .7$) and good stability, ranging from .70–.90 ($p < .001$).

School-Physical Activity Promotion Attitudes Questionnaire (SPAP-AQ, Webster et al., 2010). The SPAP-AQ consists of nine items designed to assess PCTs' attitudes toward SPAP (ATT). Example items include "Physical education is an important part of the elementary school curriculum", "Recess is an important part of the school day", and "It is important for me as a classroom teacher to be physically active". The measure uses a 4-point Likert scale (1 = Strongly Disagree; 4 = Strongly Agree). Webster et al. (2010) used exploratory factor analysis to yield the items for the SPAP-AQ. The items were shown to have acceptable construct validity (explaining over 37% of the variance), adequate internal consistency ($\alpha > .7$), and adequate stability (.77, $p < .001$).

Procedures

The Review Board for Research with Human Subjects at the researcher's university approved the study before data collection. The researcher and four assistants administered the questionnaires to the different sections of the course on the first and last day of class. All survey administrators followed the same protocol. Students in each class were told that participation in the study was optional and that choosing not to participate would not result in any negative consequence. In addition, students were informed that should they choose to participate, their responses

would be kept confidential. Participants were instructed not to put their names on any of the questionnaires, encouraged to respond honestly and asked to respond to all items. Each participant received the questionnaires as part of a packet with a cover sheet, which reiterated the same directions. The cover sheet also provided definitions of key terms used throughout the questionnaires, including physical education, physical activity and health-related physical fitness. Definitions were derived from the South Carolina (SC) 2005 Student Health and Fitness Act, which functions as a guide for SC school districts, schools and teachers regarding SPAP. During the administration of the questionnaires on the first day of class, participant confidentiality was maintained by having the participants select a number from a hat and write the number on the cover sheet. They were then instructed to write the number next to a self-made codename on a code sheet to ensure questionnaires completed at the beginning and end of the course could be matched. Participants took approximately 10–15 min to complete the questionnaires.

This study employed an uncontrolled one group prepost design, which has several limitations and possible threats to internal validity. For instance, without a control group, it is impossible to make any certain claims about the effects of the treatment (i.e., the course) on the participants' beliefs and dispositions since other factors such as history (e.g., unmeasured events that occur between Time 1 and Time 2) and testing (e.g., exposure to the questionnaires at Time 1) may influence the participants' responses at Time 2. However, it was not feasible to randomly assign participants to a control group in the context of educational coursework taken as part of a college program of study.

Data Analysis

Skewness and kurtosis statistics were used to examine whether the data were normally distributed. Results fell within an acceptable range of between -1 and 1.3 for all dependent measures. Therefore, one-way repeated measures analysis of variance (ANOVA) procedures were used to test for variation in the dependent variables (CR-Comp, Ex-Comp, PE-Comp and ATT) across time (Time 1 to Time 2). In addition, mixed-model ANOVA techniques were used to determine the effect of the independent variables (i.e., within-subjects factor: time; between-subjects factors: baseline measures of year in school, sports participation, and PA-related teaching/coaching experience) on the dependent variables. Finally, analysis of covariance (ANCOVA) procedures were performed with the dependent variables covaried for baseline measures of BMI, PE-Sat and PA-Comp. For all analyses, a preset alpha-level of significance equal to 0.05 was required for statistical significance, and significant main effects and/or interaction terms were followed up with Bonferroni post hoc tests. The SPSS statistical package (version 18.0, Chicago, IL) was used for data analysis. Data are presented as means ± *SD*, unless otherwise stated.

Results

Descriptive statistics and Cronbach alpha (1951) coefficients for PE-Sat, PA-Comp, the SPAP competence subscales and SPAP attitudes are presented in Table 1. All measures were found to exceed Nunally's (1978) criterion (≥ .70) for internal consistency. Mean response scores for each dependent measure reveal there were

Table 1 Descriptive Statistics for PE Satisfaction, PA Competence, SPAP Competence Subscales and SPAP Attitudes

	Time 1				Time 2			
	N	M	*SD*	Alpha Coefficient	N	M	*SD*	Alpha Coefficient
PE-Sat	197	3.20	.64	.79	–	–	–	–
PA-Comp	197	3.09	.55	.86	–	–	–	–
CR-Comp	201	4.54	1.37	.92	201	5.94	.86	.89
Ex-Comp	201	4.47	1.63	.86	201	5.57	1.21	.85
PE-Comp	201	3.30	1.63	.81	201	4.47	1.48	.82
ATT	201	3.37	.33	.74	201	3.47	.37	.79

Note: PE-Sat = Physical Education Satisfaction; PA-Comp = Perceived Physical Activity Competence; CR-Comp = Classroom/Recess Competence; Ex-Comp = Extracurricular Competence; PE-Comp = Physical Education Teaching Competence; ATT = Attitudes

changes in a positive direction for SPAP perceived competence and attitudes across the sample of PCTs, although the change in attitudes was minimal with mean values well above the scale median at the beginning and end of the course.

For the ANOVAs, Levene's test was nonsignificant indicating the homogeneity assumption was met. The one-way repeated-measures ANOVAs showed a statistically significant difference on all dependent measures across time (CR-Comp, $F(1, 200) = 250.13$, $p < .001$, $\eta^2 = .56$, Ex-Comp, $F(1, 200) = 109.26$, $p < .001$, $\eta^2 = .35$, PE-Comp, $F(1, 200) = 130.16$, $p < .001$, $\eta^2 = .39$, and ATT, $F(1, 200) = 16.48$, $p < .001$, $\eta^2 = .08$). These results suggest changes in PCTs' perceptions were statistically significant but based on the effect sizes, more meaningful for SPAP competence than for SPAP attitudes.

The results of the mixed model ANOVAs are presented in Table 2. None of the measured outcomes varied by year in school but SPAP competence in all three settings varied by sports participation and physical-activity-related teaching/coaching experience. PCTs who had participated in sports reported significantly higher competence than PCTs who had not participated in sports (CR-Comp, $F(1, 192) = 4.36$, $p < .05$, $\eta^2 = .02$, Ex-Comp, $F(1, 192) = 10.66$, $p < .01$, $\eta^2 = .05$, PE-Comp, $F(1, 192) = 10.86$, $p < .001$, $\eta^2 = .05$). In addition, PCTs who had taught/coached in PA settings reported significantly higher competence than PCTs' who had not taught/coached in PA settings (CR-Comp, $F(1, 197) = 8.84$, $p < .01$, $\eta^2 = .04$, Ex-Comp, $F(1, 197) = 16.53$, $p < .001$, $\eta^2 = .08$, and PE-Comp, $F(1, 197) = 31.32$, $p < .001$, $\eta^2 = .14$). SPAP attitudes (ATT) also varied by sports participation, $F(1, 192) = 21.57$, $p < .001$, $\eta^2 = .10$. These results indicate sports participation had a statistically significant though practically small effect on PCTs' perceived competence and attitudes about SPAP. Similarly, PA-related teaching/coaching experience had a statistically significant though practically small effect on perceived competence for promoting PA in the classroom, recess and extracurricular contexts. However, teaching/coaching experience had a slightly more meaningful effect on perceived competence for teaching PE.

There were also statistically significant interaction effects between sports participation and time for Ex-Comp, $F(1, 192) = 5.70$, $p < .05$, $\eta^2 = .03$, and between teaching/coaching experience and time for CR = Comp, $F(1, 197) = 6.88$, $p < .01$, $\eta^2 = .03$, Ex-Comp, $F(1, 197) = 8.08$, $p < .01$, $\eta^2 = .04$, and PE-Comp, $F(1, 197) = 4.88$, $p < .05$, $\eta^2 = .02$. Estimated marginal means indicated a larger increase in Ex-Comp for PCTs who were not sport participants (Time 1: Mean = 3.98; Time 2: Mean = 5.40) than for PCTs who were sport participants (Time 1: Mean = 4.82; Time 2: Mean = 5.71) and a larger increase in CR-Comp, Ex-Comp and PE-Comp for PCTs who had not taught/coached (Time 1: Mean = 4.30, Time 2: Mean = 5.87; Time 1: Mean = 4.07, Time 2: Mean = 5.41; Time 1: Mean = 2.79, Time 2: Mean = 4.15, respectively) than for PCTs who had taught/coached (Time 1: Mean = 4.93, Time 2: Mean = 6.04; Time 1: Mean = 5.06, Time 2: Mean = 5.81; Time 1: Mean = 4.06, Time 2: Mean = 4.96, respectively). Therefore, the course seemed to have a stronger impact on PCTs who were not sports participants and PCTs who had not taught/coached in PA settings than for PCTs who were sports participants and PCTs who had teaching/coaching experience, though the effect sizes of the interactions suggest there was little meaningful difference between groups.

The summary of the ANCOVAs is presented in Table 3. There were no observed changes on the effect of time on any of the dependent variables after controlling

Table 2 Summary of Mixed-Model ANOVAs

	CR-Comp					Ex-Comp					PE-Comp					ATT				
	Time 1		Time 2			Time 1		Time 2			Time 1		Time 2			Time 1		Time 2		
	M	*SD*	M	*SD*	F	M	*SD*	M	*SD*	F	M	*SD*	M	*SD*	F	M	*SD*	M	*SD*	F
Year in School					235.91[c]					101.35[c]					125.54[c]					14.26[c]
Low (n = 71)	4.52	1.47	5.99	.91		4.45	1.75	5.57	1.31		3.45	1.65	4.74	1.48		3.42	.33	3.51	.37	
High (n = 122)	4.54	1.30	5.90	.83		4.47	1.57	5.56	1.16		3.20	1.61	4.29	1.46		3.34	.33	3.45	.37	
Sport Participation					222.77[c]					110.34[c]					109.92[c]					18.18[c]
Yes (n = 121)	4.68	1.36	6.04	.84		4.82	1.47	5.71	1.17		3.48	1.58	4.78	1.32		3.45	.31	3.54	.35	
No (n = 73)	4.36	1.36	5.79	.86		3.98	1.76	5.40	1.24		3.00	1.63	3.95	1.58		3.23	.33	3.37	.38	
Taught/Coached					233.82[c]					99.76					119.35					13.58
Yes (n = 81)	4.93	1.23	6.04	.91		5.06	1.38	5.81	1.19		4.06	1.51	4.96	1.49		3.42	.33	3.47	.35	
No (n = 118)	4.30	1.37	5.86	.83		4.07	1.65	5.41	1.22		2.79	1.51	4.15	1.38		3.33	.33	3.47	.39	

Note: [a]p<.05, [b]p<.01, [c]p<.001; CR-Comp = Classroom/Recess Competence; Ex-Comp = Extracurricular Competence; PE-Comp = Physical Education Teaching Competence; ATT = Attitudes

Table 3 Summary of Mixed-Model ANCOVAs

	CR-Comp					Ex-Comp					PE-Comp					ATT				
	Time 1		Time 2			Time 1		Time 2			Time 1		Time 2			Time 1		Time 2		
	M	*SD*	M	*SD*	F	M	*SD*	M	*SD*	F	M	*SD*	M	*SD*	F	M	*SD*	M	*SD*	F
BMI	4.54	1.36	5.94	.86	247.76	4.47	1.63	5.57	1.21	107.08	3.30	1.63	4.47	1.48	127.95	3.37	.33	3.47	.37	16.69
PE-Sat	4.53	1.37	5.92	.86	11.24	4.46	1.65	5.55	1.21	10.88	3.27	1.62	4.43	1.47	2.37	3.37	.34	3.47	.37	.65
PA-Comp	4.53	1.37	5.92	.86	18.05	4.46	1.65	5.55	1.21	21.07	3.27	1.62	4.43	1.47	10.89	3.38	.34	3.47	.37	9.32

Note: CR-Comp = Classroom/Recess Competence; Ex-Comp = Extracurricular Competence; PE-Comp = Physical Education Teaching Competence; ATT = Attitudes; BMI = Body Mass Index; PE-Sat = Physical Education Satisfaction; PA-Comp = Perceived Physical Activity Competence

for BMI. However, after controlling for PE-Sat, the effect for time remained statistically significant but weakened considerably for CR-Comp, $F(1, 195) = 11.24$, $p < .01$, $\eta^2 = .06$, and Ex-Comp, $F(1, 195) = 10.88$, $p < .01$, $\eta^2 = .05$. In addition, the main effect for time was no longer statistically significant for PE-Comp, $F(1, 195) = 2.37$, $p = .13$, $\eta^2 = .01$, or for ATT, $F(1, 195) = .65$, $p = .42$, $\eta^2 = .00$. After controlling for PA-Comp, the effect for time remained statistically significant but weakened considerably for all dependent measures, including CR-Comp, $F(1, 195) = 18.05$, $p < .001$, $\eta^2 = .09$, Ex-Comp, $F(1, 195) = 21.07$, $p < .001$, $\eta^2 = .10$, PE-Comp, $F(1, 195) = 10.89$, $p < .01$, $\eta^2 = .05$, and ATT, $F(1, 195) = 9.32$, $p < .01$, $\eta^2 = .05$. These results suggest satisfaction with past PE experiences and perceived PA competence moderated, to varying degrees, the apparent impact of the course on PCTs' perceived competence and attitudes about SPAP.

Discussion

In tandem with an emerging literature base centered on the potential of classroom teachers to play a supportive role in school wide efforts to promote children's PA (Cothran et al., 2010; Parks et al., 2007; Webster et al., 2010), this study examined changes in PCTs' perceived competence and attitudes about SPAP while enrolled in a semester-long SPAP course. In addition, associations between biographical variables and changes in SPAP competence and attitudes were investigated, given the importance of teacher biography in teachers' professional orientations and perceived skillfulness (Callea et al., 2008; Faulkner et al., 2004; Katene et al., 2000; Matanin & Collier, 2003; Morgan & Bourke, 2008; Morgan et al., 2001; Morgan & Hansen, 2008). This study is important because it capitalizes on the critical role of preservice education in preparing classroom teachers to be advocates and activists in SPAP and elucidates possible mechanisms for enhancing the effectiveness of PCT training.

Whereas some authors have described the resilient nature of preservice teachers' beliefs and perceptions (Doolittle et al., 1993; Lawson, 1983; Lortie, 1975; Pajares, 1992; Schempp, 1989; Zeichner & Gore, 1990), the current study suggests an educational course designed to increase awareness of and skillfulness for SPAP can facilitate adaptive changes in PCTs' perceived competence and attitudes about SPAP. Participants reported significantly higher perceived competence for SPAP in all three settings (recess/classroom, extracurricular, and PE) and more favorable attitudes at the end of the 16-week course than at the beginning, thus extending Webster et al.'s (2010) finding that perceived recess/classroom competence was dependent on whether PCTs had taken such coursework. The most meaningful changes for the present sample of PCTs occurred in perceived competence for promoting PA in the classroom/recess setting, which is encouraging as PCTs uniformly work in the academic classroom and most PCTs also supervise children at recess. While many classroom teachers may lead or assist with before or after school programs, the responsibility for PA promotion in these settings is likely shared across a more diverse group of school personnel. The increase in perceived competence for PE teaching is important should any of the PCTs be called on to lead PE experiences for children. Despite the research suggesting PE should be taught by licensed specialists (Faucette & Hillidge, 1989; Faucette et al., 1990; Faucette & Patterson,

1989; Lawson et al., 1982; Morgan & Hansen, 2007; 2008), 29 states still permit nonspecialist/generalist classroom teachers to teach elementary PE (NASPE, 2010).

Assuming the course played a role in the positive changes in PCTS' perceived competence and attitudes about SPAP, it is important to critically evaluate the course components and try to determine which aspects of the educational experience were most useful in facilitating these positive changes and why. In a similar study, Xiang et al. (2002) found positive changes in PCTs' beliefs about the value and purpose of elementary PE when comparing questionnaire responses at the beginning and end of a field-based PE methods course. PCTs' ranked teaching PE in an elementary school and observing PE classes as the most influential course components in changing their beliefs. Based on these results, perhaps presenting classroom-based movement breaks, teaching academic lessons with integrated PA, teaching PE lessons and observing classmates teach played particularly useful roles in facilitating positive changes in PCTs' SPAP attitudes in the current study. In addition, these course components may have helped to facilitate the positive changes in PCTs' perceived competence for SPAP, even though the PCTs in the Xiang et al. (2002) study actually felt less competent to teach PE at the end than at the beginning of the course. Teaching a PE lesson led the PCTs' in the Xiang et al. (2002) study to view PE teaching as more complicated than they initially thought and to feel underprepared for this task. In the current study, however, initial teaching experiences (i.e., presenting a movement break and teaching a physically active classroom lesson) may have helped PCTs realize that SPAP can be relatively simple to achieve. In turn, the PCTs may have developed feelings of competence about SPAP even when challenged with the more difficult task of teaching a PE lesson later in the semester.

Similar to Morgan et al.'s (2001) study in which PCTs felt their previous sport participation experiences were important to their PE teaching competence, SPAP competence and attitudes in the current study were associated with sports participation. PCTs who were sport participants had significantly higher perceived competence to promote PA in all three school contexts and more favorable attitudes toward PA promotion. Variation was also observed by PA-related teaching/coaching experience across all three measures of perceived competence favoring PCTs who had such experience, which is consistent with Webster et al.'s (2010) findings. However, the effect sizes for between-group differences were mostly negligible and the interaction effects and estimated marginal means showed a significantly higher increase in Ex-Comp for PCTs who were not sport participants and a significantly higher increase in all three measures of perceived competence to PCTs who had not taught/coached. Thus, sport participation and PA-related teaching/coaching experience did not seem to give PCTs an advantage as learners in the course. These findings may be partly a function of the course, which was designed to help PCTs understand that PA encompasses more than sports and that SPAP, particularly in the academic classroom, at recess and in many extracurricular contexts, does not require PCTs to have learned or to teach sports concepts/skills.

Covarying for PE satisfaction attenuated the observed effect of time on perceived classroom/recess competence and extracurricular competence and resulted in a nonsignificant effect on PE teaching competence and on SPAP attitudes. In addition, covarying for PA competence attenuated the effect of time on all dependent measures. Therefore, these biographical variables, particularly PE satisfaction,

appear to be influential in the extent to which PCTs gained the skills and dispositions the course was intended to instill. Within self-determination theory (Deci & Ryan, 1985), satisfaction is closely tied to intrinsic motivation in which the drive for participation in an activity is inherent enjoyment of the activity. Intrinsically motivated students are more likely to persist on challenging learning tasks and attain higher levels of achievement than students who are driven less by enjoyment and more by other factors, such as guilt or pressure (Ntoumanis, 2001; Shen, McCaughtry, Martin, & Fahlman, 2009; Standage, Duda, & Ntoumanis, 2005). From this perspective, PCTs who were more satisfied with their past PE experiences may have engaged more in learning to teach PE during the course and actually developed higher levels of skill in teaching it.

The results of covarying for PE satisfaction and PA competence in this study build on the Webster et al. (2010) study, in which PE satisfaction and PA competence positively correlated with perceived competence and attitudes about SPAP and PA competence predicted SPAP attitudes. Combined with previous research in which these aspects of personal biography were influential in classroom teachers' perceptions related to teaching PE (Callea et al., 2008; Matanin & Collier, 2003; Morgan & Bourke, 2008; Morgan et al., 2001; Morgan & Hansen, 2008), it seems reasonable to conclude that efforts to train PCTs for PA promotion must include strategies for curbing negative feelings about school PE and personal PA competence. Preservice educators should use SPAP coursework as a platform for discussing past PE experiences and helping PCTs learn to appreciate the unique value of quality PE to the development of the whole child. Offering PCTs opportunities to engage in meaningful and enjoyable PE learning and/or teaching experiences is also recommended. Furthermore, the results of the current study have implications for those responsible for enriching children and adolescents' PA experiences and competencies. As suggested by Webster et al., (2010), "It is paramount for every child's PA experiences to be fun, enjoyable, and rewarding because there is the chance that he or she will one day choose to enter the teaching profession and draw on these experiences when asked to value and promote PA in school settings" (p. 374).

Year in school and BMI were not found to be influential in the development of perceptions and attitudes across time in this study. These results appear to be inconsistent with those of Webster et al. (2010), who found that year in school was positively correlated with perceived classroom/recess competence and PE teaching competence, while BMI was negatively correlated with perceived extracurricular competence and PE teaching competence. Nevertheless, the current study seems to suggest that in spite of possible relationships between these biographical variables and SPAP perceptions, PCTs level of advancement through their college program of study and their physical size make little difference in how receptive they are to the learning experiences offered in the course. Based on these data, preservice programs need not ensure enrollment in SPAP coursework is dependent on PCTs' stage of preparation. Nor should teacher educators expect overweight PCTs to be more resistant to the course material than others in their cohort, despite literature suggesting that when an individual's personal characteristics are consistent with or "match" task demands (e.g., physical activity promotion), the individual is more likely to demonstrate approach tendencies (e.g., positive perceptions and behaviors) in relation to the task (Lerner, 1985).

There were several limitations in the current study. The absence of a control group prevents making any certain claims about the influence of the course on participants' perceptions and attitudes. Future research might employ a cohort design to examine between-group differences on changes in perceived competence and attitudes about SPAP for PCTs enrolled in two or more courses with different educational orientations. For instance, many teacher education programs still require PCTs to take a course on teaching PE, while other programs do not require PCTs to take any courses related to SPAP. A cross-program study in which three groups of PCTs participated, one group taking a SPAP course, one group taking a PE methods course, and one group taking neither course during the same time frame might help to more specifically identify aspects of preservice training that are most useful in preparing PCTs for SPAP. In the current study, querying PCTs about which aspects of the course were most influential in shaping perceptions and attitudes would also have provided more insight into the respective functions of different course experiences. Another possible limitation was that the researcher taught several sections of the course and this might have biased participants' responses in a more favorable direction despite precautionary measures that were taken (e.g., personnel other than the course instructors administered the questionnaires, participants identified themselves with codenames on their questionnaires to maintain confidentiality, participants were informed that participation was voluntary and had no bearing on the course grade). Finally, despite ensuring consistency of course objectives and outlines across the different classes participating in this study, instructor behaviors and class events were not monitored. It is possible that there was variation across classes in educational experiences, which may have confounded the results reported herein. It is recommended that future studies consider including observations of class sessions or having the course instructors keep a log of their content coverage and class activities so that possible teacher effects on measured outcomes can be analyzed.

With increasing attention to schools as central in the fight against childhood obesity, it has become paramount for research to explore the potential of schools to enact recommended strategies for PA promotion. Elementary classroom teachers are positioned to play a prominent role in SPAP, but their agency in doing so will likely be determined, at least in part, by their perceptions and attitudes. This study focused on preservice education as a viable place to instill the skills and dispositions needed to effectively promote PA in multiple school contexts. Although PE teaching was one of the outcomes investigated, it is clear from past research and from current guidelines that classroom teachers would be expected to have more impact as PA promoters in the academic classroom, at recess, and in before and after school settings. The results of this study suggest PCTs can learn to be competent in these domains of PA promotion and value the role of the classroom teacher in school wide promotion efforts. It remains to be seen, however, whether perceived competence and attitudes translate to actual promotion behavior once PCTs enter schools as newly hired teachers. For instance, theory and research suggest attitude is a strong predictor of teachers' intentions to promote PA (e.g., Ajzen & Fishbein, 2005; Martin, Kulinna, Eklund, & Reed, 2001). Moreover, continued research is needed to determine how preservice programs can help to prevent biographical characteristics, such as negative K-12 PE experiences, from creating possible barriers to PCTs' development as partners in SPAP.

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